Apertural Microprojection Size Correlations in Pupillid and Polygyrid Land Snails

BY

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(7 Plates)

INTRODUCTION

The presence of microprojections on the barriers and interior apertural walls in many groups of snails was noted many years ago, but effective study of this phenomenon required availability of the scanning electron microscope (hereafter SEM). A general review of this subject (Solem, 1972) and a subsequent discussion of family level differences in the form of the barrier microprojections (Solem, 1973a) were preliminary to the present investigation, which was designed as a student project during a Summer Workshop in scanning electron microscopy at Field Museum of Natural History.

We sought to explore two aspects of microprojection structure – were there microprojection size differences among congeneric species that demonstrated different degrees of apertural narrowing by the major barriers, and were there noticeable differences in microprojection size and structure of subadult, adult and gerontic individuals of the same species. Solem (1972) had hypothesized that species with more constricted apertures would have relatively larger microprojections, but neither this aspect nor the question of ontogenetic differences had been investigated previously.

Species belonging to the Pupillidae and Polygyridae were utilized, since in both families the reflected lip and apertural barriers develop in a relatively short period of time at the end of active shell growth. In some groups studied previously, such as the Endodontidae and Charopidae, apertural barriers are present throughout the post-embryonic life (Solem, 1973a, 1973b). Similarly, the larval shells studied by Robertson (1971) provided no opportunity to evaluate ontogenetic changes in microprojections. The pupillids and polygyrids provided suitable taxa for investigating these questions.

MATERIALS

After joint consultation on procedures and objectives, the reference collections were searched by SL for suitable sets of specimens. We sought to use common, widely distributed species, mainly live collected examples without heavy mucoid deposits (see Solem, 1970: 399 for a discussion of SEM viewing problems caused by mucus deposits), and sets with a variety of growth stages present. Initial selection of material by SL was checked by AS, and then the specimens selected and cleaned for mounting.

The specimens used in this project were:

Family Pupillidae

Gastrocopta (Albinula) armifera (Say, 1821)
FMNH 18739. Bluff of Sangamon River, Menard County, Illinois

FMNH 66310. Joliet, Will County, Illinois. E. E. Hand! 29 Oct 1909

Gastrocopta (Albinula) contracta (Say, 1822)
FMNH 157685. Glencoe Beach, Glencoe, Cook County, Illinois (subfossil) A. Solem! 3 Sep 1951

Gastrocopta (Albinula) holzingeri (Sterki, 1889)
FMNH 64851. Joliet, Will County, Illinois. James Ferriss!

Gastrocopta (Vertigopsis) pentodon (Say, 1821)
FMNH 64894. Joliet, Will County, Illinois. James Ferriss!

Vertigo (Vertigo) morsei Sterki, 1894
FMNH 144863. Lake James, Steuben County, Indiana. W. S. Blatchley! 12 Jul 1903

Vertigo (Vertigo) tridentata Wolf, 1870
FMNH 115040. Canton, Fulton County, Illinois. *ex* John Wolf. Probable paratypes

Family Polygyridae

Polygyra (Daedalocheila) auriformis (Bland, 1859)
FMNH 49944. San Pedro Park, San Antonio, Bexar County, Texas

Polygyra (Erymodon) mooreana (Binney, 1857)
FMNH 78534. Oglesby, Coryell County, Texas. Frank E. Simmons! 1951

Polygyra (Erymodon) dorfeuilliana sampsoni Wetherby, 1881
FMNH 15438. Butler, Kansas. 1875. *ex* Elihu Hall

From one to eight individuals of each species were cleaned and mounted, but actual photographs were made on a lesser number of examples. The specimens remain in the collection of Field Museum, having been demounted and returned to their original containers.

METHODS

Preparation and mounting of the shells followed the basic technique outlined in Solem (1970). Overnight soaking of the specimens in a vial of water tended to loosen dirt particles. A 5 to 10 second immersion in a sonic cleaner then usually was sufficient to remove nearly all particles. Rubber cement blobs were used to fasten the shells to the SEM stubs, after air drying of the cleaned specimens. All specimen mounting was done by SL.

The stubs were coated first with carbon and then with gold in an Edwards vacuum evaporator, prior to examination in a Cambridge S4-10 Stereoscan, which was operated by AS and assisted by SL. Photographs were taken on Polaroid Type 55 P/N film. Magnifications were ad-

Explanation of Figures *1* to *6*

Gastrocopta armifera (Say, 1821)

bluff of Sangamon River, Menard County, Illinois. FMNH 18739

Figure *1*: Entire shell, fully adult × 23.6
Figure *2*: Slightly subadult aperture × 45
Figure *3*: Microprojections on columellar wall of juvenile × 611
Figure *4*: Juvenile aperture × 45
Joliet, Will County, Illinois. E. E. Hand! Oct. 29, 1909. FMNH 66310
Figure *5*: Gerontic aperture with fully developed microprojections × 46
Figure *6*: Microprojections on parietal lip of gerontic shell × 611

Explanation of Figures *7* to *12*

Gastrocopta armifera (Say, 1821)

bluff of Sangamon River, Menard County, Illinois. FMNH 18739

Figure *7*: Edge of aperture, juvenile shell, showing thin lip and paucity of microprojections × 120
Figure *8*: Edge of aperture, gerontic shell, showing thickened lip and density of microprojections × 116
Figure *9*: Growth surface at end of columellar barrier, subadult shell × 1 115

Gastrocopta pentodon (Say, 1821)

Joliet, Will County, Illinois. James Ferriss! FMNH 64894

Figure *10*: Edge of aperture, juvenile shell × 125
Figure *11*: Edge of aperture, gerontic shell × 119

Gastrocopta armifera (Say, 1821)
Joliet, Will County, Illinois. E. E. Hand! October 29, 1909 FMNH 66310

Figure *12*: Microprojections on palatal wall of gerontic specimen × 1 115

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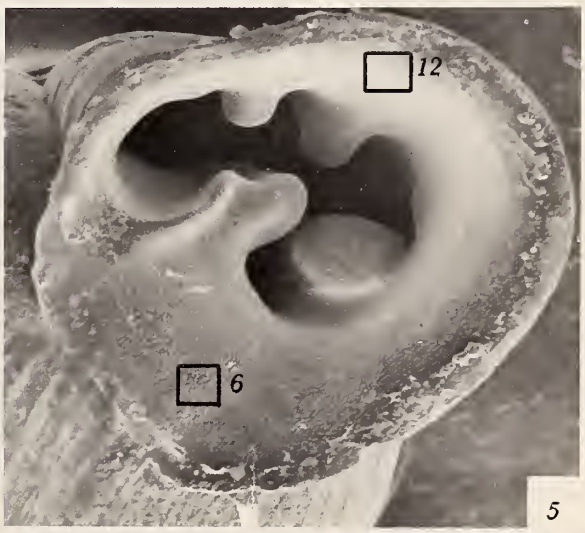

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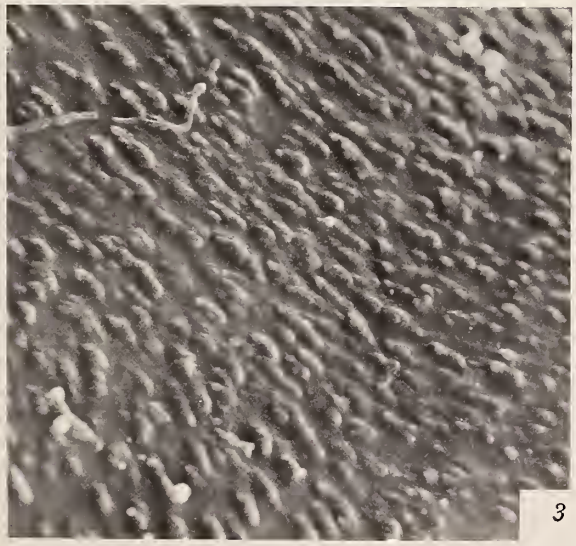

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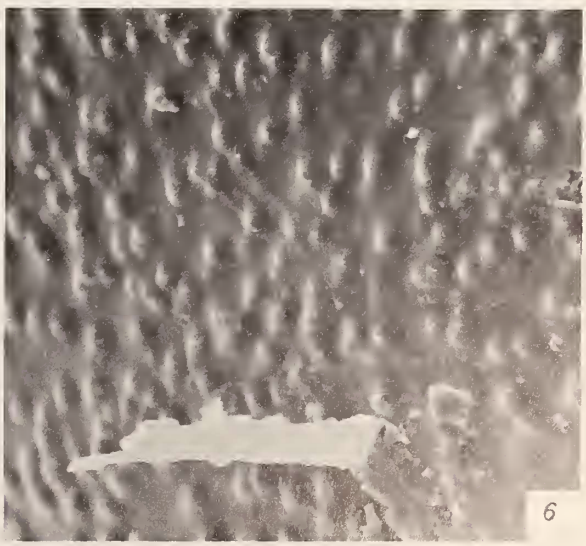

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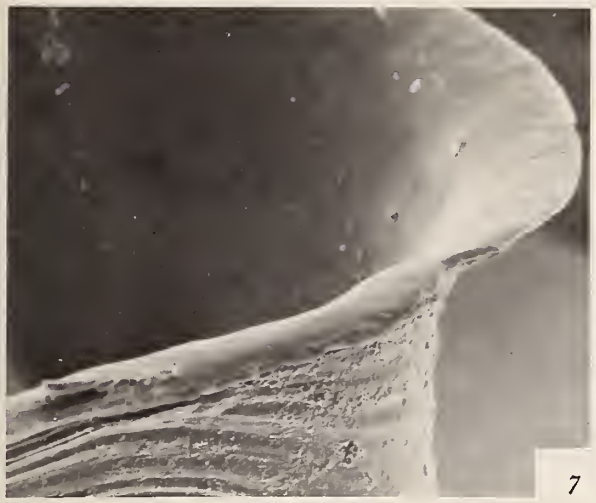
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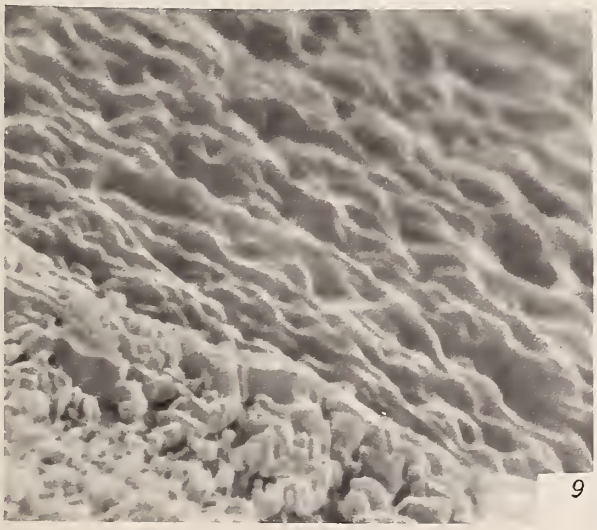
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